

WHAT IS CLAIMED IS:

1. A system for provisioning QoS paths with restoration in
2 a network, comprising:

3 a primary path generator configured to identify a suitable
4 primary path between source and destination nodes in a network;

5 an auxiliary graph generator, associated with said primary
6 path generator, configured to construct a directed auxiliary graph
7 from an undirected graph representing said network by reversing
8 each link in a primary QoS path of said undirected graph and
9 replacing each other link in said undirected graph by two directed
10 links;

11 a walk identifier, associated with said auxiliary graph
12 generator, configured to identify a walk in said auxiliary directed
13 graph corresponding to a set of bridges in said network; and

14 a bridge identifier, associated with said walk identifier,
15 configured to identify a set of bridges in said network such that
16 at least one link of said primary path is protected by a bridge.

2. The system as recited in Claim 1 wherein said auxiliary
2 graph generator is further configured to assign a zero cost to said
3 each link and said walk identifier is configured to reduce a cost
4 of said walk.

3. The system as recited in Claim 1 wherein said walk
2 identifier is configured to satisfy a delay constraint and apply a
3 modified restricted shortest path algorithm to identify said walk.

4. The system as recited in Claim 1 wherein said walk
2 identifier is configured to identify multiple walks in said
3 auxiliary directed graph, said multiple walks representing multiple
4 restoration paths.

5. The system as recited in Claim 1 wherein said primary
2 graph generator further determines said primary QoS path.

6. The system as recited in Claim 1 wherein said walk
2 identifier decomposes said walk to a set of bridges.

7. The system as recited in Claim 1 wherein said system is
2 associated with a network operations center of said network.

8. A method of provisioning QoS paths with restoration in a
2 network, comprising:

3 identifying a suitable primary path between source and
4 destination nodes in a network;

5 constructing a directed auxiliary graph from an undirected
6 graph representing said network by reversing each link in a primary
7 QoS path of said undirected graph and replacing each other link in
8 said undirected graph by two directed links;

9 identifying a walk in said auxiliary directed graph
10 corresponding to a set of bridges in said network; and

11 identifying a set of bridges in said network such that at
12 least one link of said primary path is protected by a bridge.

9. The method as recited in Claim 8 further comprising
2 assigning a zero cost to said each link and said walk identifier is
3 configured to reduce a cost of said walk.

10. The method as recited in Claim 8 wherein said identifying
2 comprises satisfying a delay constraint and employing a modified
3 restricted shortest path algorithm to identify said walk.

11. The method as recited in Claim 8 wherein said identifying
2 comprises identifying multiple walks in said auxiliary directed
3 graph, said multiple walks representing multiple restoration paths.

12. The method as recited in Claim 8 wherein said
2 constructing comprises determining said primary QoS path.

13. The method as recited in Claim 8 wherein said identifying
2 comprises combining ones of said bridges to form a restoration
3 topology.

14. The method as recited in Claim 8 wherein said method is
2 carried out in a network operations center of said network.

15. A method of provisioning restoration paths in a network,
2 comprising:

3 constructing a graph representing said network and having
4 nodes and links;

5 identifying a primary QoS path in said graph;

6 reversing all of said links that are in said primary QoS path
7 and replacing each other link in said graph by two directed links;

8 finding in said graph a lower cost walk that satisfies
9 adjusted delay constraints; and

10 selecting a subset of bridges in said network such that each
11 link of said primary QoS path is protected, said subset
12 constituting one of said restoration paths.

16. The method as recited in Claim 15 wherein a cost of said
2 subset is a minimum.

17. The method as recited in Claim 15 further comprising
2 assigning a zero cost to said each link that originated from said
3 primary QoS path and reducing a cost of said walk.

18. The method as recited in Claim 15 wherein said selecting
2 comprises satisfying a delay constraint and employing a modified
3 restricted shortest path algorithm.

19. The method as recited in Claim 15 further comprising

2 determining said primary QoS path.

20. The method as recited in Claim 15 further comprising

2 combining ones of said bridges to form a restoration topology.

21. The method as recited in Claim 15 wherein said method is

2 carried out in a network operations center of said network.